Plant Tissue Systems

Ground Tissues ← Ground Meristem

Parenchyma - living - primary ground tissue

Collenchyma - living

Sclerenchyma - dead → Fibers, Sclereids

Vascular Tissues ← Procambium

Xylem → water, minerals; dead (scl., par.) → Tracheids, Vessel Members

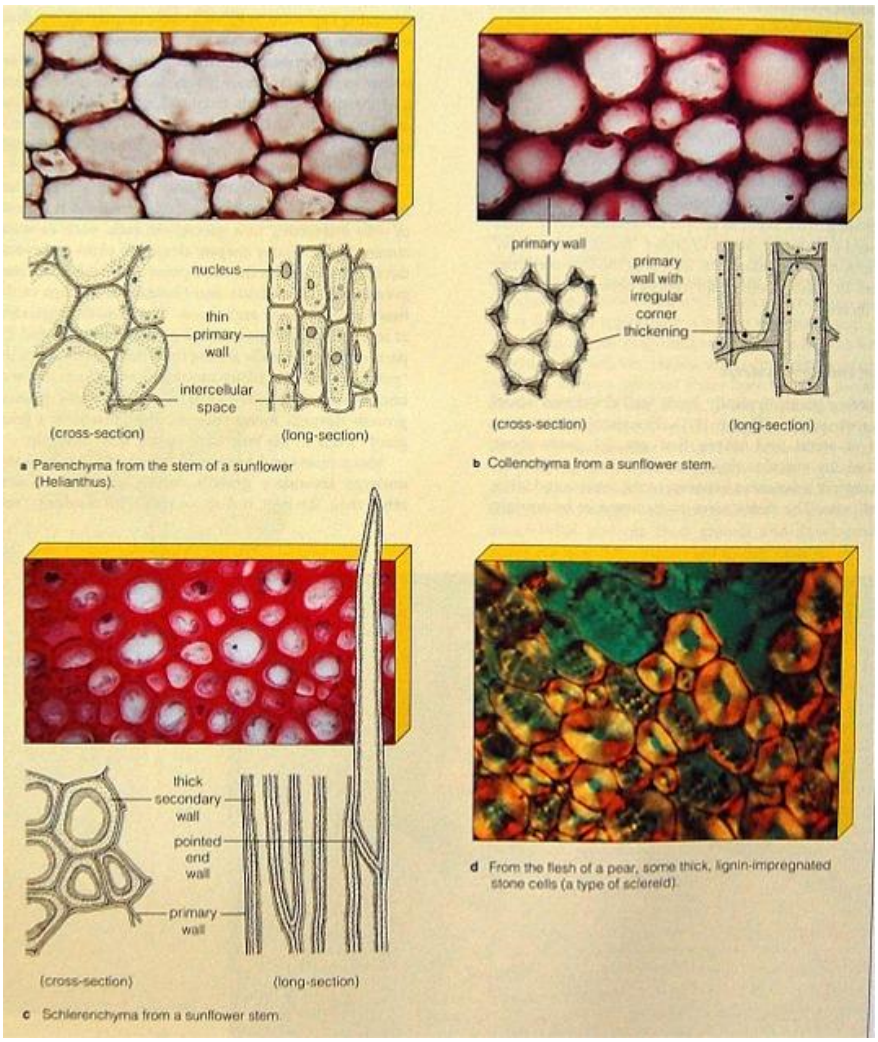
Phloem → sugars; living (par., scl.) → Sieve Tube Members, Companion Cells

Dermal Tissues ← Protoderm

Epidermis - living (par.) → incl. root hairs, guard cells. etc.

Periderm - secondary growth → Cork (dead), Cork Cambium (living), Parenchyma Cells (living)

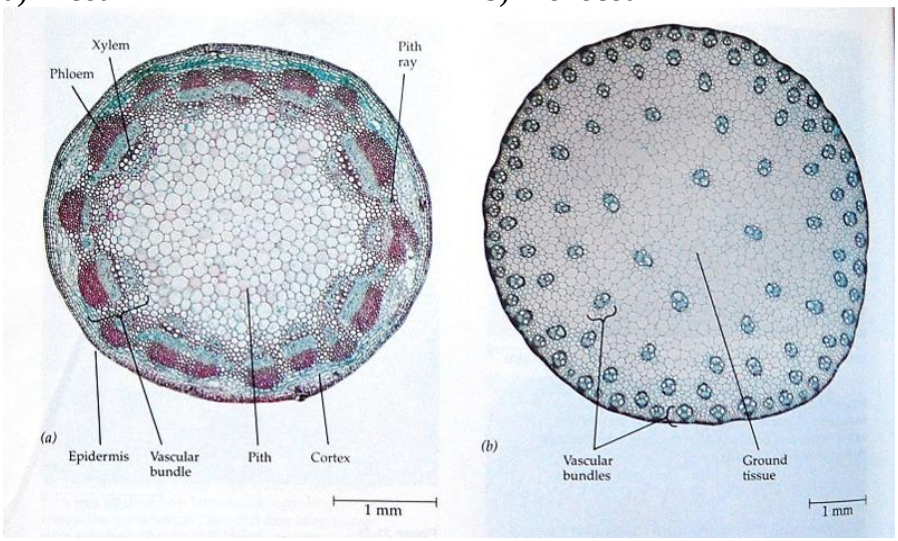
Ground Tissues



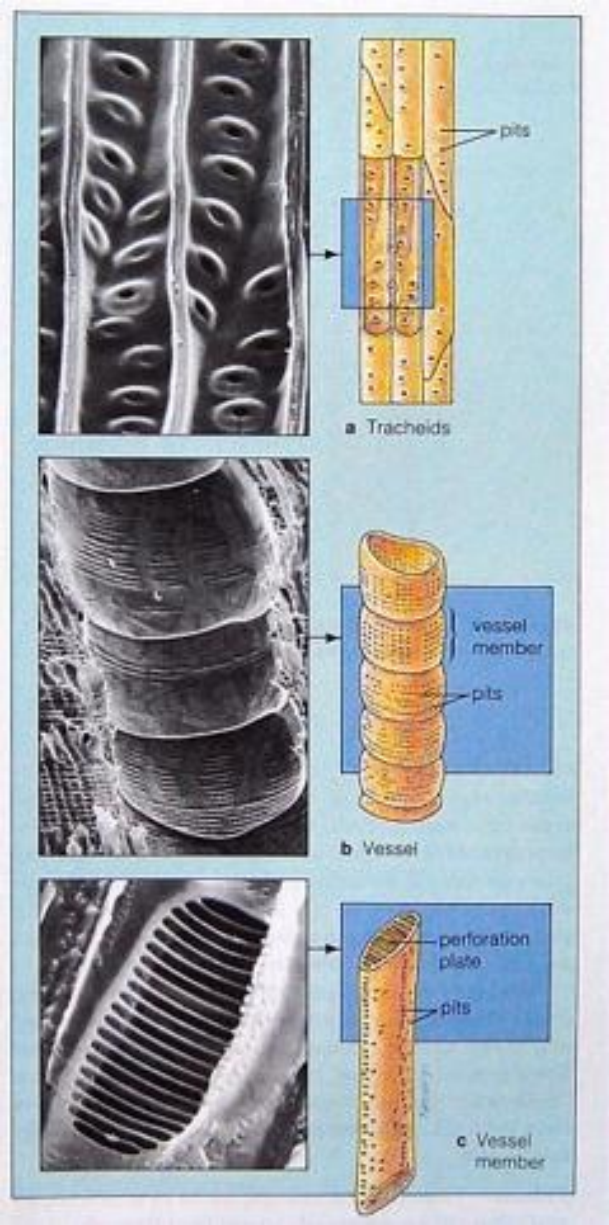
Vascular Bundle Arrangement

a) Dicot

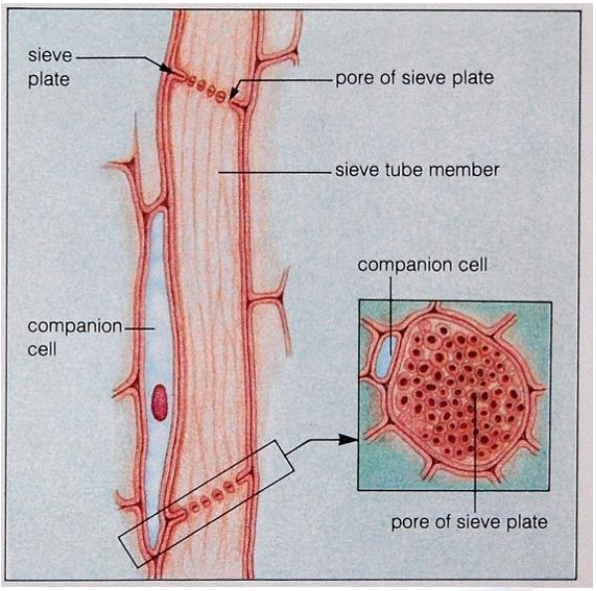
b) Monocot

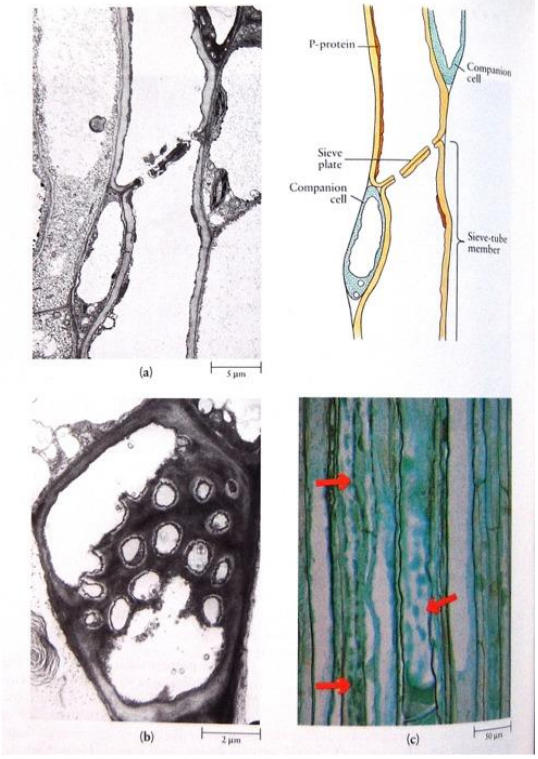


Xylem Cells

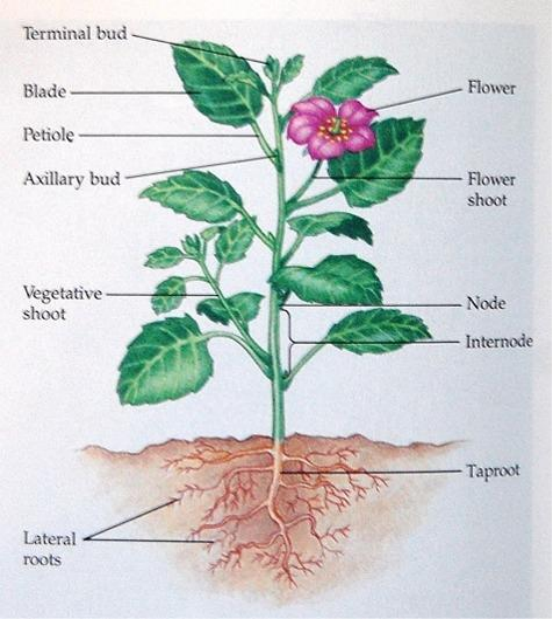


Phloem Cells

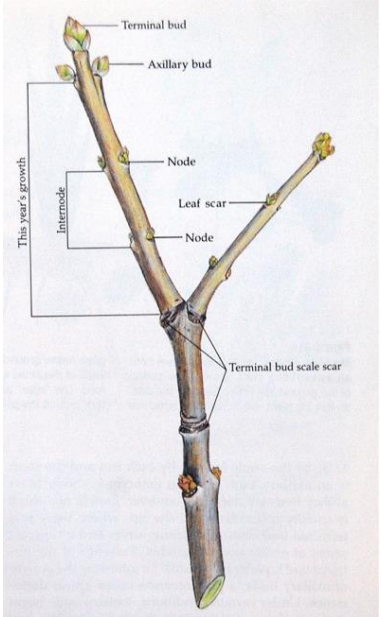




Shoot and Root Systems



Twig/Shoot Anatomy



Dicot vs. Monocot Leaves; Simple vs. Compound Leaves

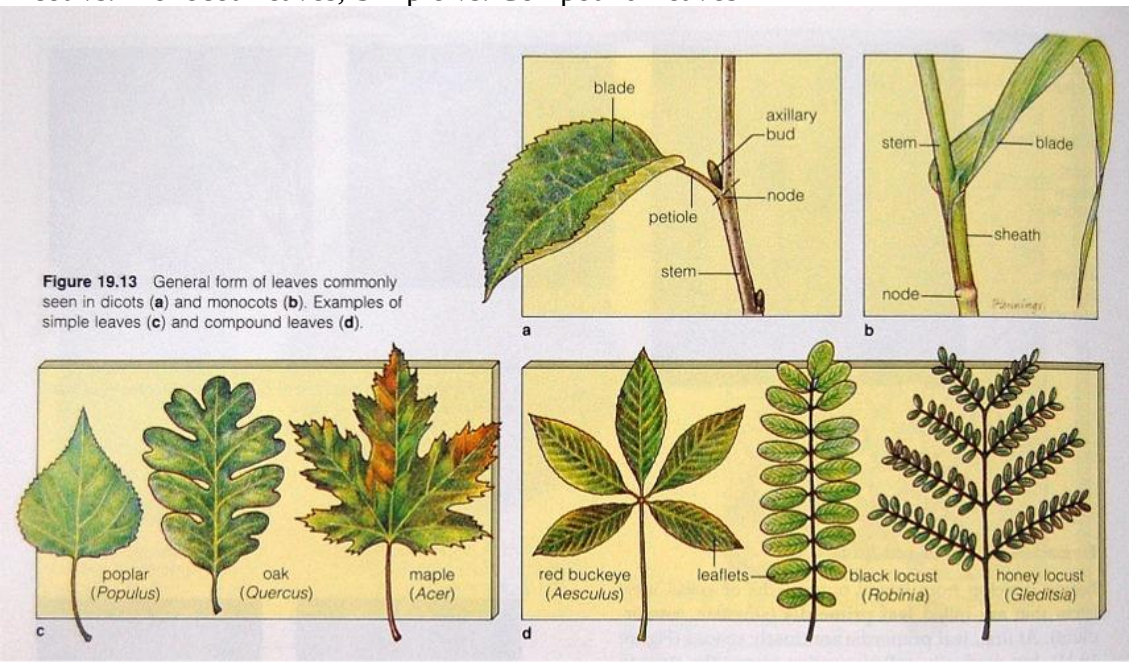
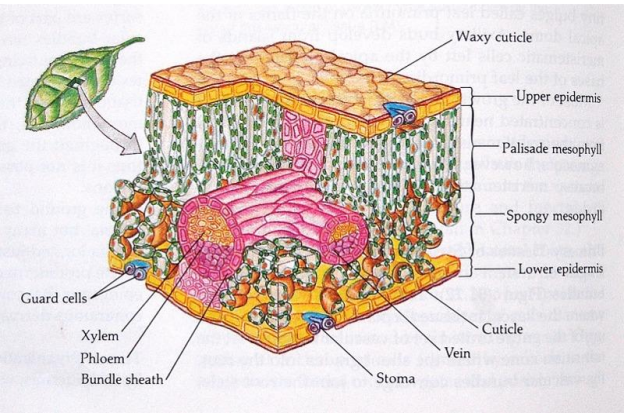
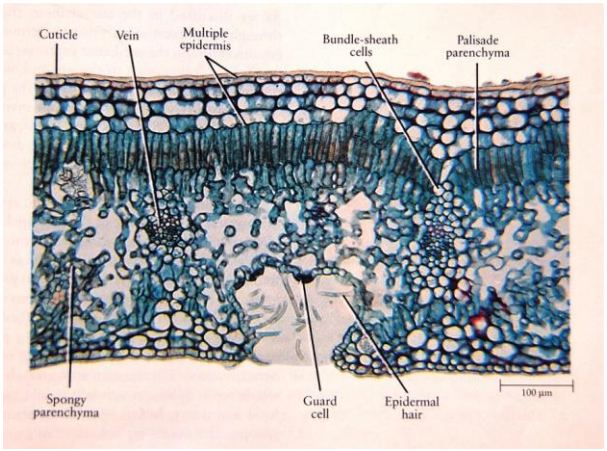


Figure 19.13 General form of leaves commonly seen in dicots (**a**) and monocots (**b**). Examples of simple leaves (**c**) and compound leaves (**d**).

Leaf Cross Section





Modified Stems

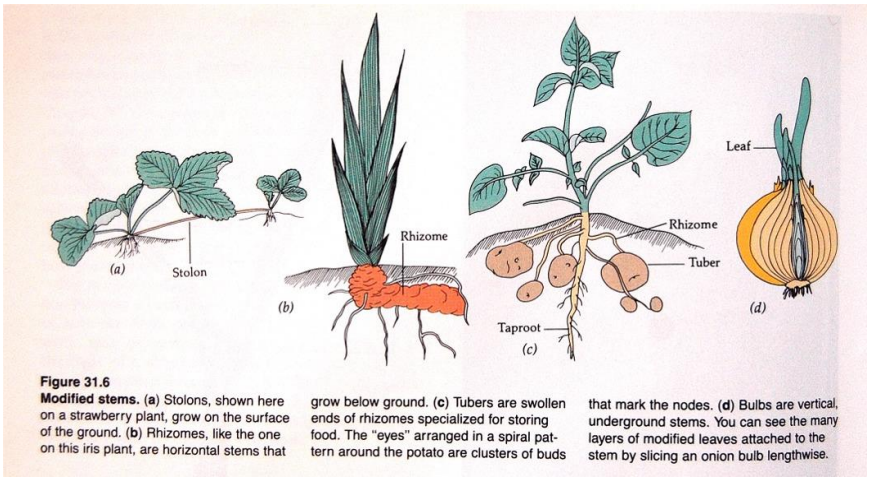
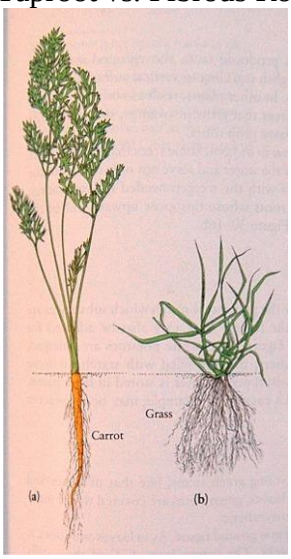
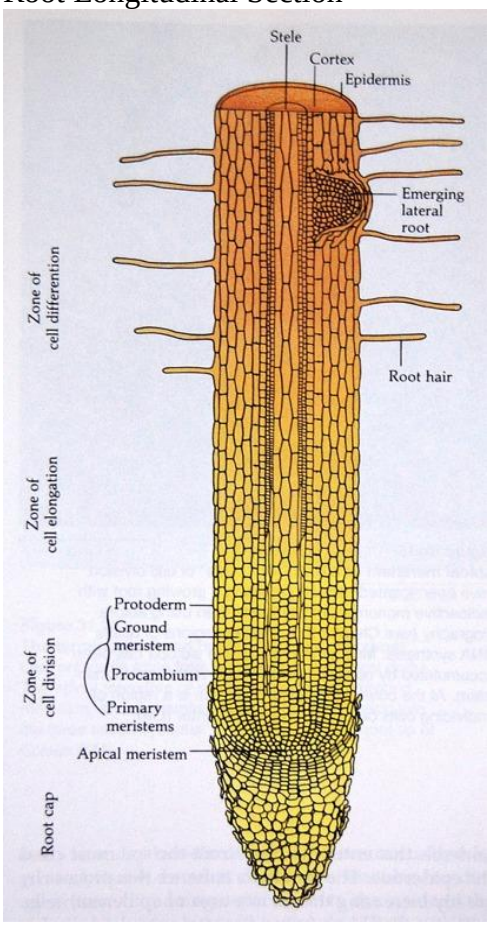


Figure 31.6
Modified stems. (**a**) Stolons, shown here on a strawberry plant, grow on the surface of the ground. (**b**) Rhizomes, like the one on this iris plant, are horizontal stems that grow below ground. (**c**) Tubers are swollen ends of rhizomes specialized for storing food. The "eyes" arranged in a spiral pattern around the potato are clusters of buds that mark the nodes. (**d**) Bulbs are vertical, underground stems. You can see the many layers of modified leaves attached to the stem by slicing an onion bulb lengthwise.

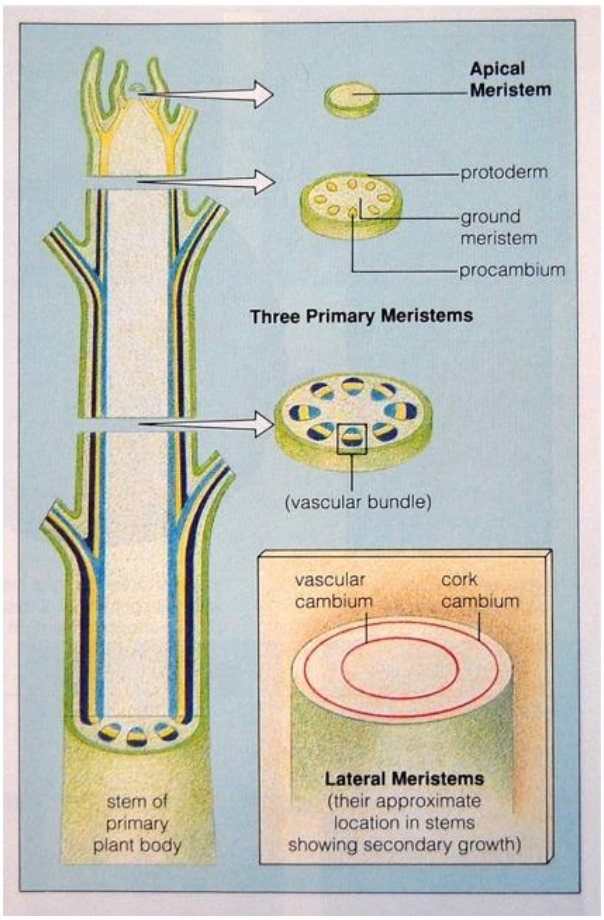
Taproot vs. Fibrous Root



Root Longitudinal Section



Meristems

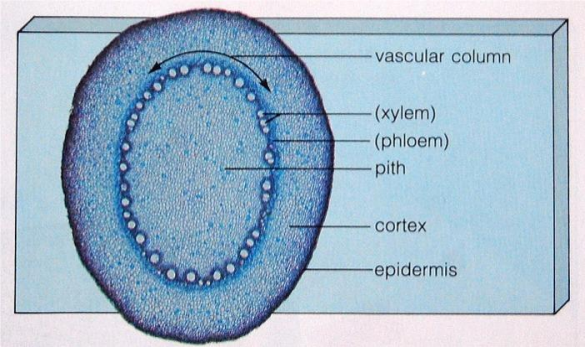


Meristems

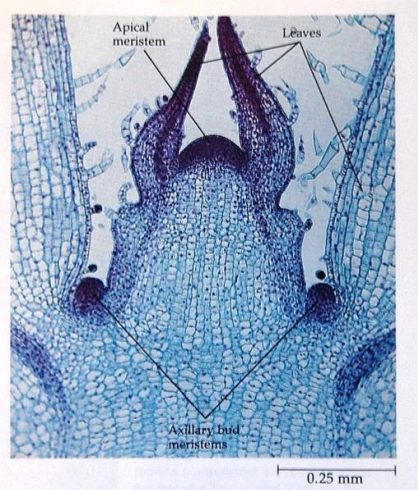
Apical Meristems
- Protoderm → Epidermis
- Ground Meristems → Ground Tissues
- Procambium → Vascular Tissues

Lateral Meristems
- Vascular Cambium
  - → Secondary Xylem
  - → Seconday Phloem
- Cork Cambium
  - → Cork
  - → Parenchyma

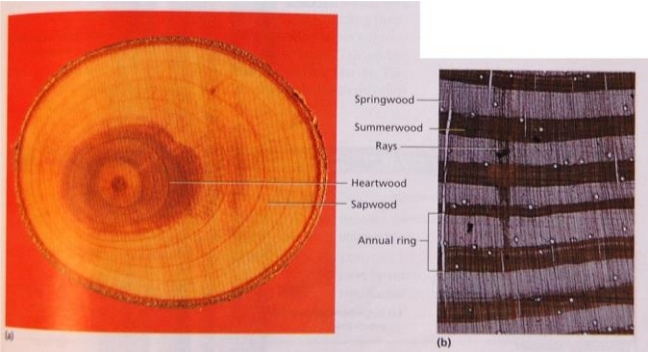
Root Cross Section (dicot)



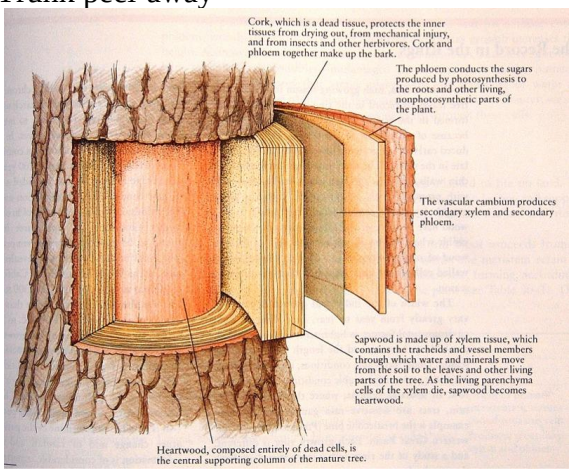
Shoot Tip



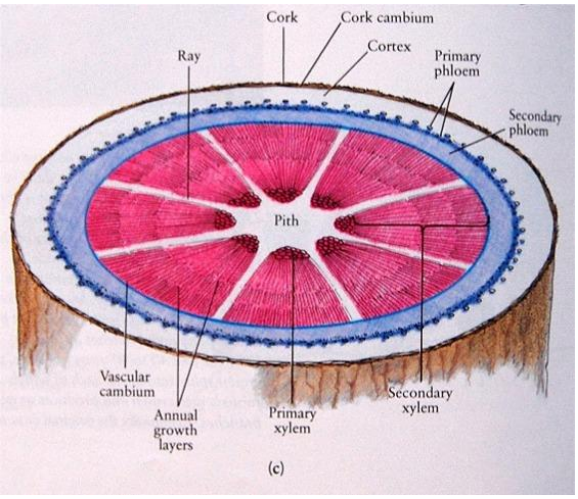
Annual Rings; Heartwood and Sapwood



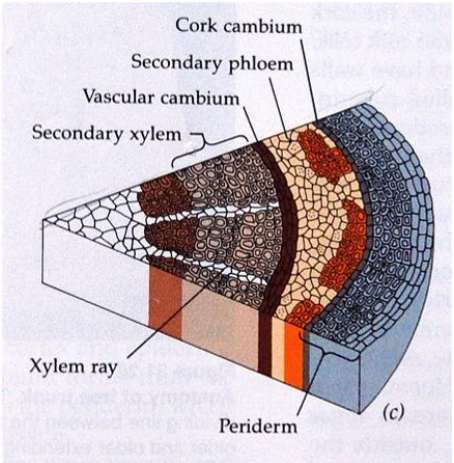
Trunk peel-away



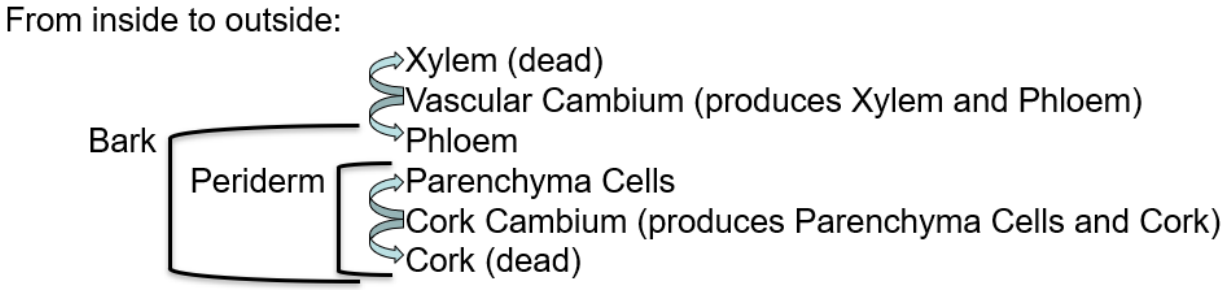
Trunk Cross Section



Trunk Cross Section



Woody Growth



Summary of Primary and Secondary Growth

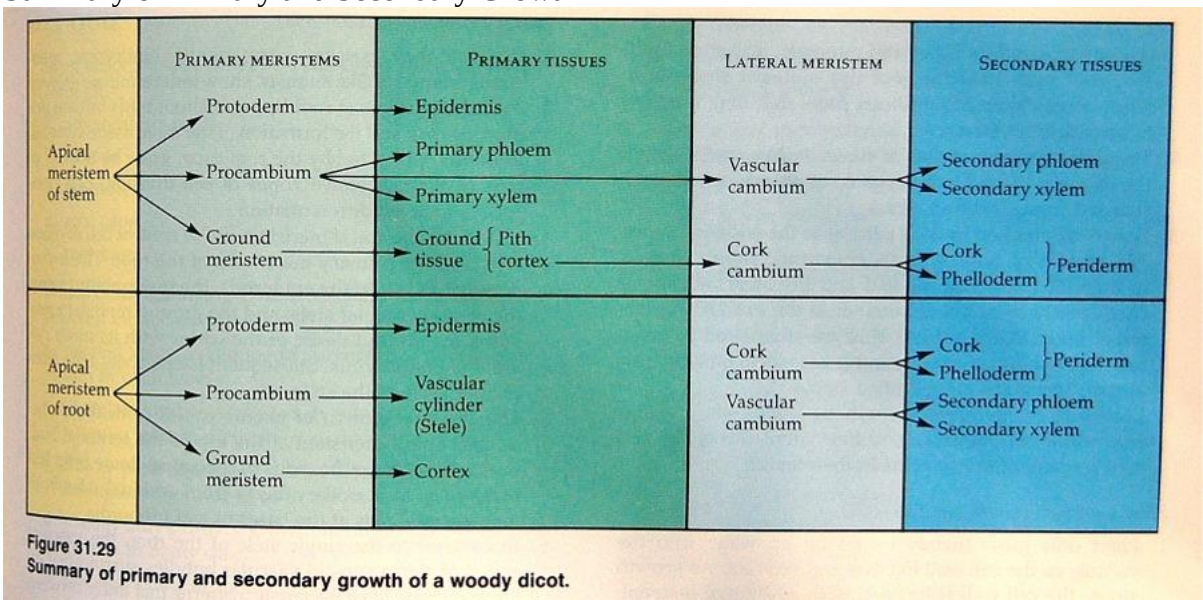


Figure 31.29
Summary of primary and secondary growth of a woody dicot.